

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,878,245 B2
APPLICATION NO. : 10/085338
DATED : April 12, 2005
INVENTOR(S) : Srinivas Gandikota et al.

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

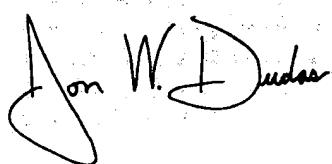
The title page should be deleted and substitute therefore the attached title page.

Drawings:

Delete drawings sheets 2-6, and substitute therefore the drawing sheets, consisting of Figs. 2-6 as shown on the attached pages.

Signed and Sealed this

Tenth Day of October, 2006



JON W. DUDAS
Director of the United States Patent and Trademark Office



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(12) United States Patent
Gandikota et al.

(10) Patent No.: US 6,878,245 B2
(45) Date of Patent: Apr. 12, 2005

(54) METHOD AND APPARATUS FOR REDUCING ORGANIC DEPLETION DURING NON-PROCESSING TIME PERIODS

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 10/085,338

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(65) Prior Publication Data

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(51) Int. Cl.: C25D 17/00; C25D 21/00

(52) U.S. Cl.: 204/275.1; 204/224 R; 204/237; 205/101; 205/148

(58) Field of Search: 204/237, 238, 204/245, 263, 264, 275.1, 276; 205/99, 101, 123, 148

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Primary Examiner—Roy King

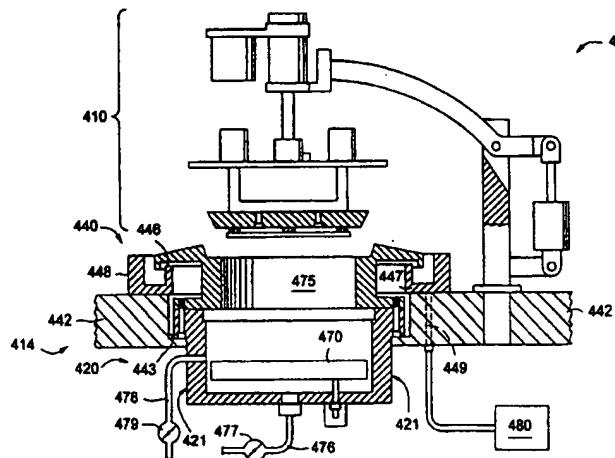
Assistant Examiner—William T. Leader

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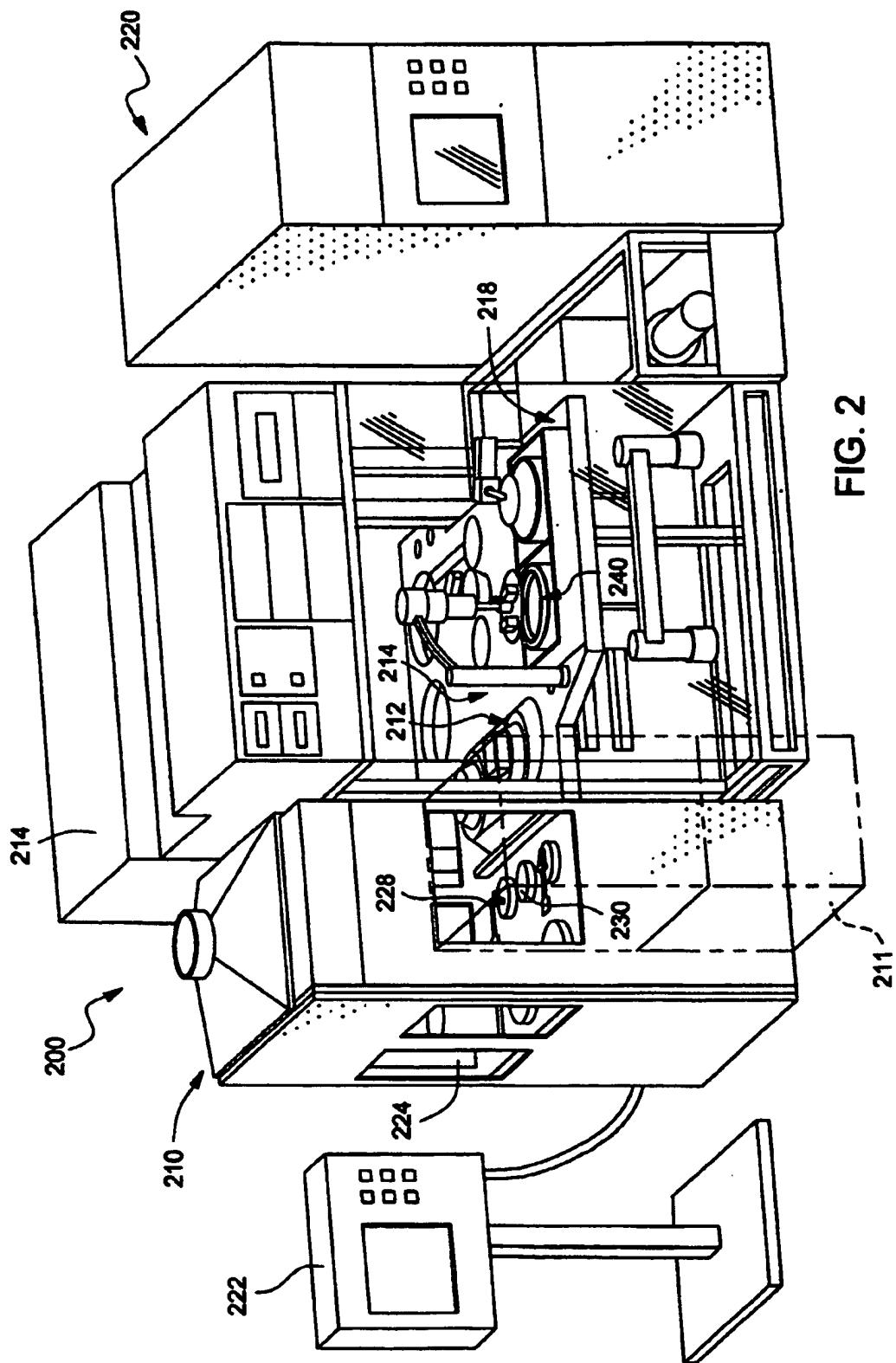
(57) ABSTRACT

Embodiments of the invention generally provide an apparatus and method for replenishing organic molecules in an electroplating bath. The replenishment process of the present invention may occur on a real-time basis, and therefore, the concentration of organics minimally varies from desired concentration levels. The replenishment method generally includes conducting pre-processing depletion measurements in order to determine organic depletion rates per current density applied in the electroplating system. Once the organic depletion rates per current density are determined, these depletion rates may be applied to an electroplating processing recipe to calculate the volume of organic depletion per recipe step. The calculated volume of organic depletion per recipe step may then be used to determine the volume of organic molecule replenishment per unit of time that is required per recipe step in order to maintain a desired concentration of organics in the plating solution. The calculated replenishment volume may then be added to the processing recipe so that the replenishment process may occur at real-time during processing periods. The apparatus generally includes a selectively actuated valve in communication with a fluid delivery line, wherein the valve is configured to fluidly isolate a plating cell during a non-processing time period. The valve may be controlled by a system controller, and thus, the fluid level in the cell may be controlled during a non-processing time period.

17 Claims, 7 Drawing Sheets



(Continued)



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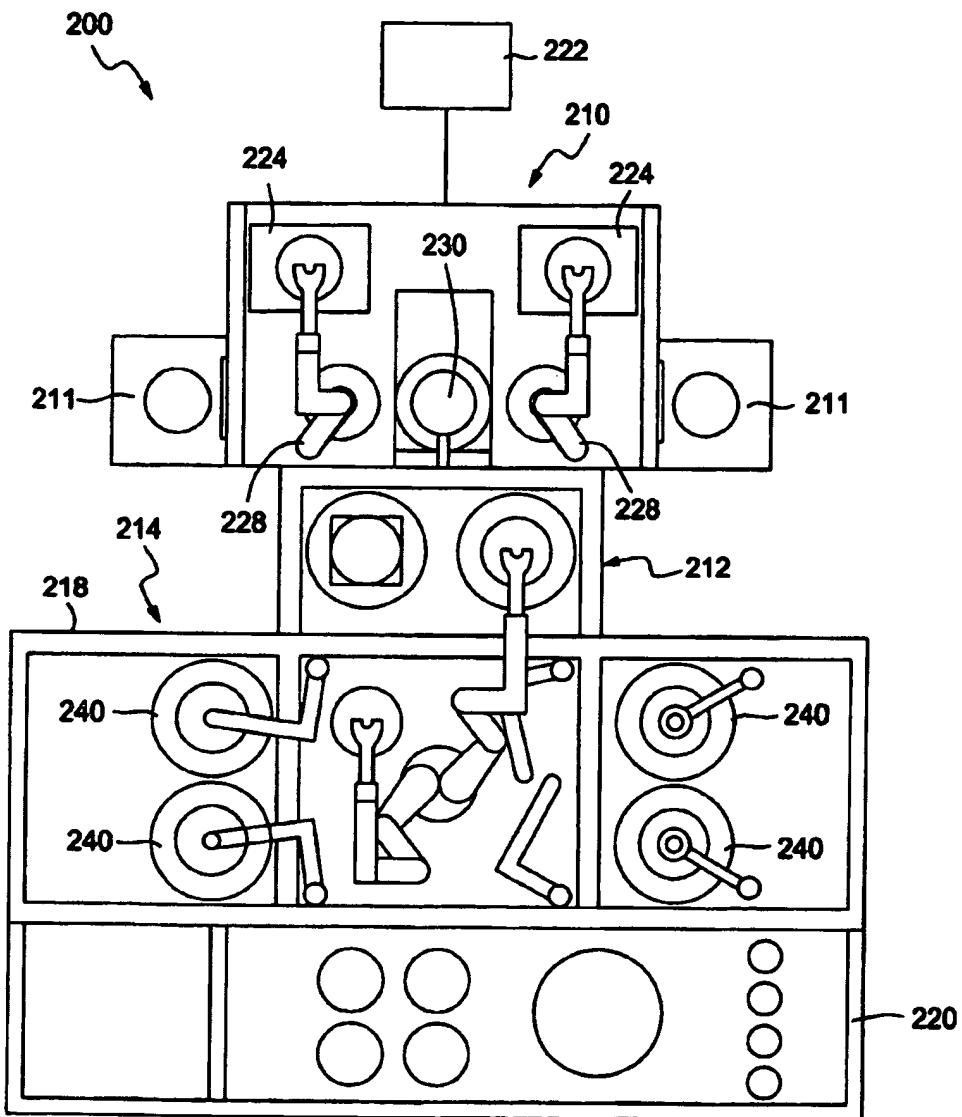


FIG. 3

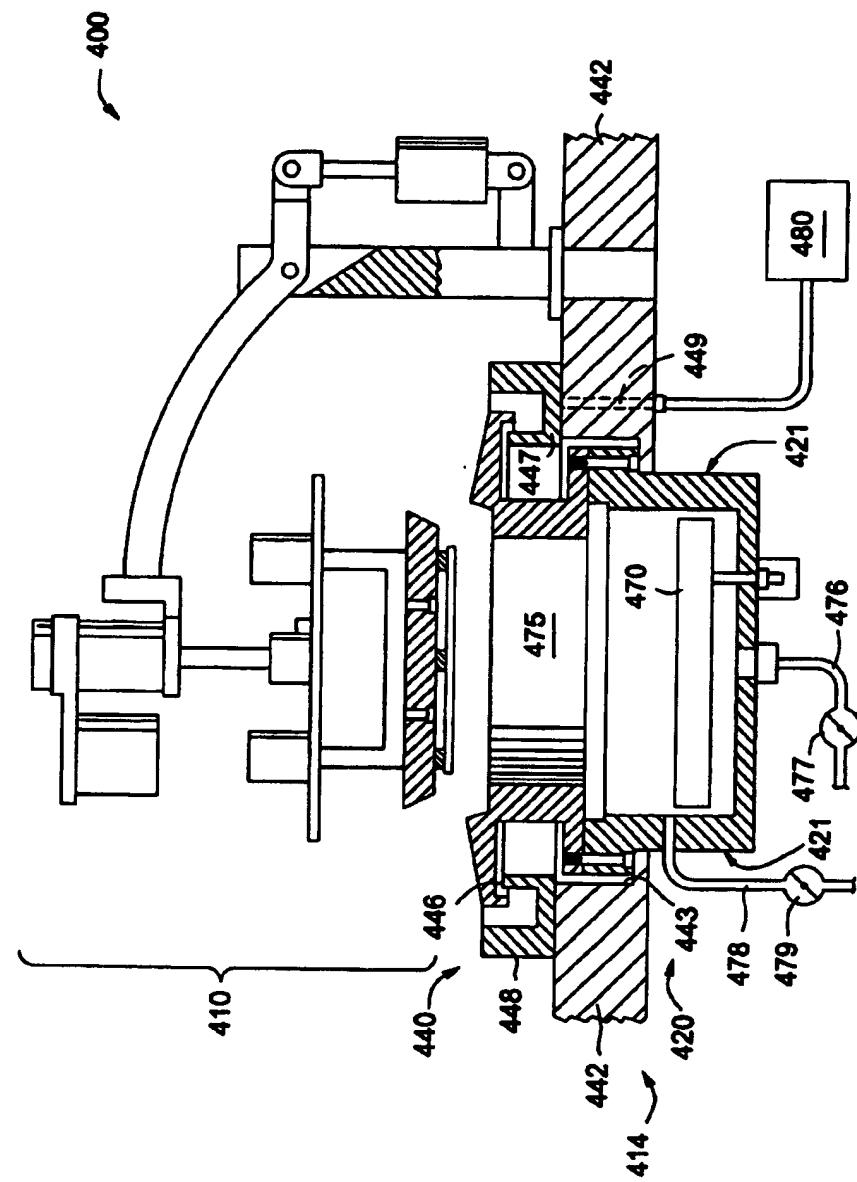


FIG. 4

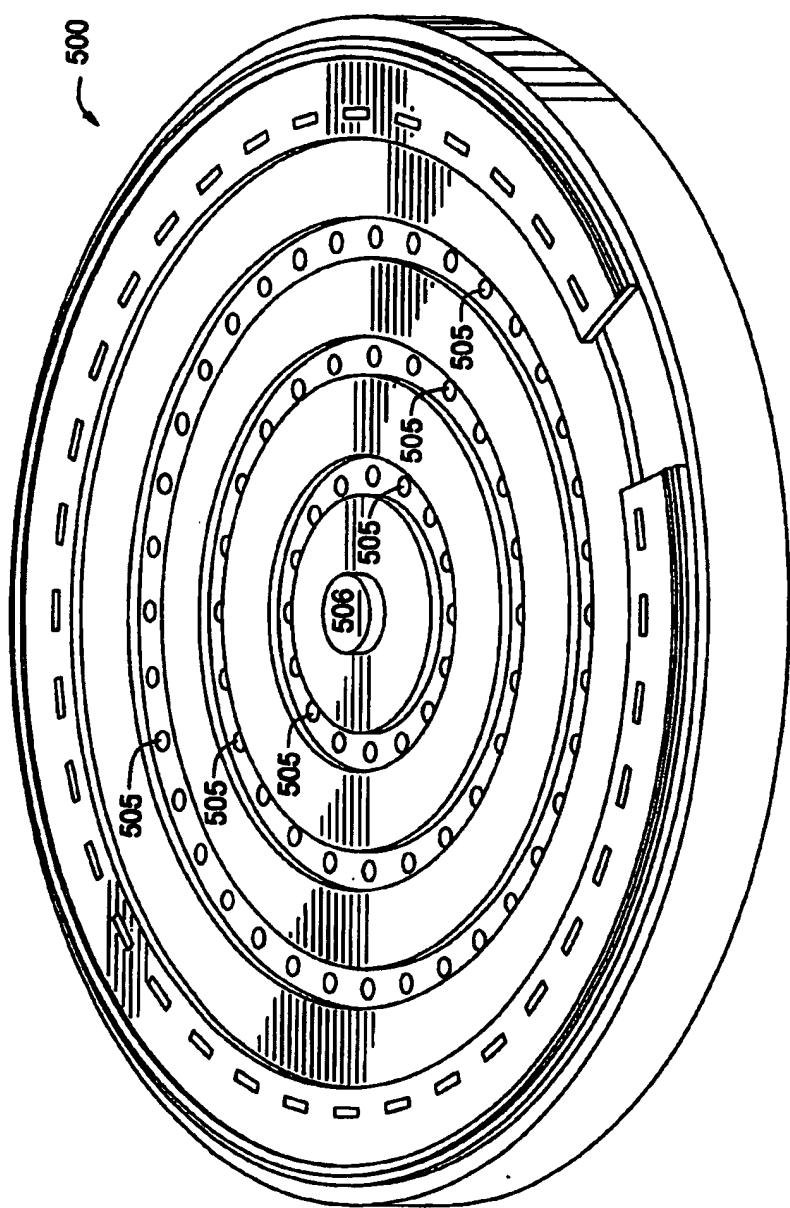


FIG. 5

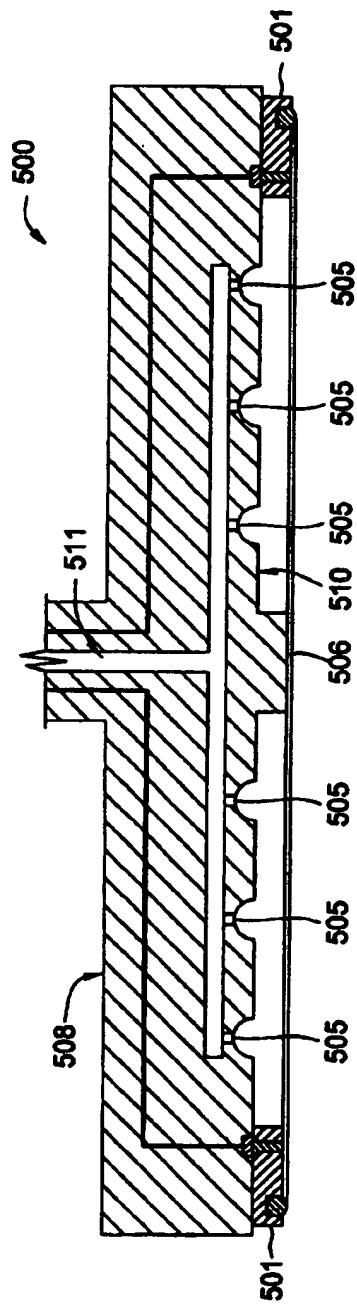


FIG. 6